Peter Freyd, Peter O'Hearn, John Power, Robert Tennent and Makoto Takeyama
Bireflectivity
`http://www.elsevier.nl/locate/entcs/volume1/power`

Motivated by a model for syntactic control of interference, we introduce a general categorical concept of bireflectivity. Bireflective subcategories of a category **A** are subcategories with left and right adjoint equal, subject to a coherence condition. We characterize them in terms of split-idempotent natural transformations on $\mathbf{id_A}$. In the special case that **A** is a presheaf category, we characterize them in terms of the domain, and prove that any bireflective subcategory of **A** is itself a presheaf category. Given a small symmetric monoidal category **C**, we define diagonal structure on **C**, which is that structure and a little less than those axioms required to prove the monoidal structure is finite product structure. We then obtain a bireflective subcategory of $[\mathbf{C}^{\mathrm{op}}, \mathbf{Set}]$ and deduce results relating its finite product structure with the monoidal structure of $[\mathbf{C}^{\mathrm{op}}, \mathbf{Set}]$ determined by that of **C**. We also investigate closed structure.

Philippa Gardner
A name-free account of action calculi
`http://www.elsevier.nl/locate/entcs/volume1/gardner`

Action calculi provide a unifying framework for representing a variety of models of communication, such as CCS, Petri nets and the π-calculus, within a unified setting. A central idea is to model the interaction between actions using names. We introduce a name-free account of action calculi, called the closed action calculi, and show that there is a strong correspondence between the original presentation and the name-free presentation. These results show that, although names play an important presentational role, they are in some sense inessential.

Andrew D. Gordon
Bisimilarity as a theory of functional programming
`http://www.elsevier.nl/locate/entcs/volume1/gordon`

Morris-style contextual equivalence – invariance of termination under any context of ground type – is the usual notion of operational equivalence for deterministic functional languages such as FPC (PCF plus sums, products and recursive types). Contextual equivalence is hard to establish directly. Instead we define a labelled transition system for call-by-name FPC (and variants) and prove that CCS-style bisimilarity equals contextual equivalence – a form of operational extensionality. Using co-induction we establish equational laws for FPC. By considering variations of Milner's 'bisimulations up to $\sim$' we obtain a second co-inductive characterisation of contextual equivalence in terms of reduction behaviour and production of values. Hence we use co-inductive proofs to establish contextual equivalence in a series of stream-processing examples. Finally, we consider a form of Milner's original context lemma for FPC, but conclude that our form of bisimilarity supports simpler co-inductive proofs.

D.N. Hoover
Maximal limit spaces, powerspaces, and Scott domains
`http://www.elsevier.nl/locate/entcs/volume1/hoover`

We explore an area that connects classical Hausdorff topology and the Scott domain theory and serves as a foundation for a denotational semantics of numerical programs.

Our key notion is that of a maximal limit space, a T_0 space (X, T) in which every net that has a limit point has a unique limit point maximal in the specialization order induced by T. Maximal limit spaces combine features of Hausdorff spaces and domains and form a bridge between those two categories. Every Hausdorff space is a maximal limit space, and maximal limit spaces are preserved under product, closed subspace, and function space constructions. A topological version of the lifting construction, familiar in domain theory,